
MARIA ABOU CHAKRA

POSITIONS HELD

CURRENT, FROM JULY 2016

Research Associate

University of Toronto, Canada

Donnelly Centre for Cellular and Biomolecular Research

Mathematical modelling of stem cell development as part of the Medicine by Design Project. Developing a predictive 4D model.

JAN 2011-JULY 2016

Post-Doctoral Researcher

Max Planck Institute, Plön, Germany

Dep. of Evolutionary Theory

Using Evolutionary Game theory to understand the emergence of complex interactions.

2013-2015

Anthony (5.2013) & Olivia (1.2015)

Part-time and Maternity

I have worked part-time or taken maternity leave during these years.

2002-2010

Research Assistant

McMaster University, Hamilton

Dep. of Biology, Dr J. Stone (2004-2010)

Studied the morphological disparity in echinoid skeletons.

Dep. of Math. and Stats., Dr M. Lovric (2002-2005)

Summarized survey results from educational research.

Dep. of Health Science, Dr J. Bain (2002-2004)

Studied the effects of tension on the various cell layers surrounding a nerve fibre.

2000-2010

Teaching Assistant

McMaster University, Hamilton

Dep. of Biology (2004-2010)

Dep. of Mathematics and Statistics (2000-2004)

Graded students and conducted tutorials.

2000-2005

Material Curator and Programmer

AECON:AGI Traffic Tech, Scarborough

Designed and created billing and material tracking programs.

McMaster University, Hamilton

Created a protocol for a mark calculating program.

🏠 University of Toronto, Donnelly Centre, Canada
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📄 <http://individual.utoronto.ca/abouchakra>

EDUCATION

2006-10 **Doctor of Philosophy**

THEORETICAL BIOLOGY

Dep. of Biology, McMaster University

Thesis: Modelling echinoid skeletal growth and form

2004-05 **M.Sc., Transferred to Ph.D.**

1999-03 **Honors Bachelors of Science**

GENERAL BIOLOGY, *McMaster University*

Thesis: Understanding the effects of tension on rat sciatic nerve.

COMPUTATIONAL EXPERIENCE

1994- Programming: QBasic, Visual Basic, VBA, C, C++, bash, awk, and Python

2004- Mathematica
Certification for Mathematica Advance Level Foundation

TEACHING EXPERIENCE

2011-15 **Max-Planck Institute**

Lecturer: designed a course to introduce modelling of biological systems.

Lübeck University and CAU Kiel

Co-lecturer: presented a lecture on evolutionary game theory.

2000-09 **McMaster University**

Biology Teaching Assistant: Third year Evolution, Vertebrate Anatomy, and Animal Physiology.

Calculus Teaching Assistant: Calculus for Engineering I and II, Science I and II, and Social Sciences.

PROFESSIONAL SERVICE

- Active Reviewer for:**
JTB, Sci. Reports, APS PRE
PloS ONE & Comp. Bio.
BMC Biology, Royal Society Interface
- 2021- **Modeling Cell Development & Regeneration Discussion Group.** Organise discussions -Virtual.
- 2016 **Bridging theory and experiments:** Developed the idea to combine the fields. Co-organised and hosted an international workshop.
- 2016-19 **Medicine by Design: Single Cell, Organoid & Comp. Bio Discussion Groups.** Co-organise discussions and workshops.
- 2014-17 **Unconscious Biases: Equality and Gender Meeting.** Organise discussions and workshops about issues surrounding EDI.
- 2013- **Mentor:** I believe this is lacking in general, so I act as a mentor for several postdocs and graduate students.
- 2004-10 **Public Outreach.** Lets Talk Science, I'm a Scientist USA- Evolution..others.
- 2015-17 **ESEB: Equal Opportunity Committee.** Chair of the subcommittee preparing the official guidelines to improve diversity.
- 2014-16 **Post-Doctoral and PhD representative.** Representative of all the scientists at the institute.
- 2009-10 **Faculty of Science Graduate Curriculum and Policy Committee.**
- 2008-09 **Women In Science and Engineering (WISE).**
- 2012 **Evolution Conference.** &
2006-09 **Biology Symposium.** Sessional chair, poster and presentation judge.
- 2006 **Faculty Candidate Search Committee.**
- 2004-06 **Life Science Art Committee.**

INVITED TALKS

- 21.7.2021 Cell and Gene Therapies Innovation Showcase - Virtual
- 3.11.2019 The Till & McCulloch Meetings
Montreal, Canada.
- 13.1.2016 CCCC Workshop
- 8.3.2013 5th Workshop Theoretical Biology.
Plön Germany.
- 31.10.2008 Biomimetic Symposium.
McGill, Montreal, Canada.

CONTRIBUTIONS

POSTERS

- 15.11.2021 **Abou Chakra, M.,** Bader, GD.
Using a mathematical model to understand how cells transition in a controlled and timely manner. 2021 Till & McCulloch Meetings, Virtual.
- 25.08.2021 **Abou Chakra, M.,** Bader, GD.
Control of tissue development and cell diversity by cell cycle-dependent transcriptional filtering. HCA Dev-Ped cell atlas, Virtual.
- 13.11.2017 **Abou Chakra, M.,** Bader, GD.
Modeling Stem Cell Development and Differentiation. EDEV2017, EPFL Lausanne.
- 20.6.2005 **Abou Chakra, M.,** Stone, J. R.
Using geometric morphometrics for developing evolutionary hypotheses about morphological transitions, NAPC, Halifax.

PRESENTATIONS

- 25.08.2021 **Abou Chakra, M.,** Bader, GD.
Control of tissue development and cell diversity by cell cycle-dependent transcriptional filtering. HCA Dev-Ped cell atlas, Virtual.
- 16.6.2014 **Abou Chakra, M.,** Traulsen, A.
Collective Risk Dilemma and Risky Climate Game. ECMTB, Gothenberg.
- 2.4.2014 **Abou Chakra, M.**
Modelling Disparity among Sister Taxa: Growth and Form, Size and Shape Workshop, Göttingen.
- 23.8.2012 Testing Evolutionary Hypothesis about Echinoid Growth and Form, 14th International Echinoderm Conference, Brussels.
- 20.8.2013 **Abou Chakra, M.,** Hilbe, C. and Traulsen, A.
A Retaliatory Parasite Makes An Offer A Host Should Not Refuse. ESEB, Lisbon.
- 10.7.2012 Modeling the Emergence of Mafia-like Behaviour in a Bird Host-Parasite System, Evolution, Ottawa.
- 25.5.2009 **Abou Chakra, M.,** Stone, J. R.
Using Bubbles to Model the Growth of Sea Urchin Skeletons. Origins Conference. Hamilton.
- 26.6.2008 Descartes, Plateau and Sea Urchins. Design and Nature IV. Algarve.
- 4.19.2008 Circle-Packing, Soap Bubbles and Sea Urchins. 2nd Annual Women in Science and Engineering Conference. Hamilton. (1st Place Award)

PUBLICATIONS

- Abou Chakra, M.**, Isserlin, R., Tran. T., Bader, G. (2021) Control of tissue development and cell diversity by cell cycle-dependent transcriptional filtering. *eLife* Jul 2;10:e64951. doi: 10.7554/eLife.64951
- Abou Chakra, M.**, Bunmann, S., Schenk, H., Oschlies, A., Traulsen, A. (2018) Facing uncertain climate change, immediate action is the best strategy. *Nature Communications* 9:2566 doi:10.1038/s41467-018-04968-1
- Valier, M., **Abou Chakra, M.**, Hindersin, L., Linnenbrink, M., Traulsen A., Baines J. (2017) Evaluating the maintenance of disease-associated variation at the blood group-related gene B4galnt2 in house mice. *BMC Evolutionary Biology* 17:187, doi: 10.1186/s12862-017-1035-7
- Abou Chakra, M.**, Hilbe C., Traulsen A. (2016) Coevolutionary interactions between Famers and Mafia induce host acceptance of avian brood parasites. *Royal Society Open Science*, doi:10.1098/rsos.160036
- Haafke, J., **Abou Chakra, M.**, Becks L. (2016) Eco-evolutionary feedback promotes Red Queen dynamics and selects for sex in predator populations. *Evolution*. 70-3:641-652 doi:10.1111/evo12885
- Hagel, K.* , **Abou Chakra, M.***, Bauer, B., Traulsen, A., (2016) Which risk scenarios can drive the emergence of costly cooperation? *Scientific Reports*. 6:19269, doi:10.1038/srep19269 * 1st authorship
- Abou Chakra, M.**, Hilbe C. (2015) Modelling the dynamics of crime and punishment: Comment on Statistical physics of crime: A review by M.R. D’Orsogna and M. Perc. *Physics of Life Reviews*, 12:22-23
- Abou Chakra, M.**, Hilbe C., Traulsen A. (2014) Plastic behaviors in hosts promote the emergence of retaliatory parasites. *Scientific Reports*, 4:4251, doi:10.1038/srep04251
- Mobley K. B., **Abou Chakra, M.**, Jones A. (2014) No evidence for size-assortative mating in the wild despite mutual mate choice in sex-role-reversed pipefishes. *Ecology & Evolution*. 4:67-78. doi: 10.1002/ece3.907
- Abou Chakra, M.**, Traulsen A. (2014) Under high stakes and uncertainty the rich should lend the poor a helping hand. *Journal of Theoretical Biology*. 341:123-130. doi: 10.1016/j.jtbi.2013.10.004
- Abou Chakra, M.**, Hall B.K., Stone, J. R. (2013) Using Taxonomists Heads to recapitulate craniate-vertebrate phylogenetic history. *Historical Biology* doi:10.1080/08912963.2013.825792
- Hilbe C., **Abou Chakra, M.**, Altrock P., Traulsen A. (2013) The evolution of strategic timing in collective-risk dilemmas. *PloS ONE*. 8(6): e66490. doi:10.1371/journal.pone.0066490
- Abou Chakra, M.**, Traulsen A. (2012) Evolutionary dynamics of strategic behavior in a collective-risk dilemma. *PloS Computational Biology*, 8(8): e1002652 doi:10.1371/journal.pcbi.1002652
- Abou Chakra, M.**, Stone, J. R (2011) Holotestoid: A new echinoid test growth model. *Journal of Theoretical Biology*, 285:113-125. doi: 10.1016/j.jtbi.2011.06.019
- Abou Chakra, M.**, Stone, J. R. (2011) Classifying skeleton models to test ideas about growth and form. *Paleobiology*, 37:686-695
- Abou Chakra, M.**, Stone, J. R. (2008) Descartes, Plateau and Sea Urchins. *Design and Nature IV*, WIT Transactions on Ecology and the Environment, 114:97-105